

EXPERIMENTAL INFECTION OF DOMESTIC BIRDS BY COTYLURUS STRIGEOIDES DUBOIS, 1958 (TREMATODA: STRIGEIDAE)

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Dedicated to Doc. RNDr. Bohumil Ryšavý, D. Sc., Corresponding Member of the Czechoslovak Academy of Sciences, on the occasion of his 50th birthday

Abstract. The trematode *Cotylurus strigeoides* Dubois, 1958 was obtained from *Columba livia dom* L., *Gallus gallus* L. and *Anas platyrhynchos dom.* L., experimentally fed with mollusks of the species *Lymnaea stagnalis* L. and *L. auricularia* L. Until the present leeches have been described as the second intermediate hosts. Natural infections by this trematode species were found in the localities under investigations in *Anas platyrhynchos dom.* L., *A. platyrhynchos* L., *A. strepera* L., *Aythya ferina* L. and *A. fuligula* L.

The tetracotyle of trematodes of the genus *Cotylurus* Szidat, 1928 is difficult to identify especially in naturally infected mollusks because it is of similar morphology and size. For a reliable identification of the species knowledge has to be made available on its habits by experimental breeding of the trematodes.

MATERIAL AND METHODS

Mollusks harbouring tetracotyle were fed to domestic birds in order to identify the various members of the genus *Cotylurus* Szidat, 1928. The mollusks were collected in fishponds in southern Bohemia. The trematodes recovered were kept in saline in the refrigerator at 6—10° C for 24 hours and then stained with carmine. The trematodes recovered in post mortem examinations from naturally infected ducks were kept in the refrigerator under the same conditions, then fixed in 60% alcohol and stained.

RESULTS

DESCRIPTION OF THE STAGES USED FOR EXPERIMENTAL INFECTION

Tetracotyle *Cotyluri* spec.

Host: *Lymnaea stagnalis* L., *L. auricularia* L. Location: Hepatopancreas, sexual glands. Incidence: in 89.8 % of a total of 395 snails examined. Intensity of infection: 3—21 tetracotyle per snail.

The general measurements of the tetracotyle are given in Table I. The pyriform tetracotyle is covered by a bi-layered wall. Minute channels perforate the wall on the

cranial and caudal pole. In the cup-shaped forebody of the dorsoventrally flattened tetracotyle, the oral and ventral sucker, the pharynx, the pseudosuckers and the holdfast organ with its lobes are clearly visible. The gland of this organ is compact. Small cellular rudiments of the sexual organs are placed in the caudal portion of the body. In most cases, these organs were overlaid by a secondary excretory network.

Table 1. Metric data of the tetracotyle *Cotyluri* spec. (Measurements in μ .)

		Opravilová 1969	Our findings
Cyst	Length	359—434	340—520
	Width	217—366	320—420
Metacercaria	L.	310—379	—
	W.	276—317	—
Oral sucker	L.	60—69	60—72
	W.	63—69	48—60
Pharynx	L.	24—30	18—24
	W.	27—30	18—24
Ventral sucker	L.	66—75	60—66
	W.	66—75	60—72
Holdfast organ	L.	—	72—122
	W.	—	118—148
Cyst wall	W.	21—24	24—36
Second intermediate hosts:		<i>Erpobdella</i> <i>octoculata</i> L. <i>E. lineata</i> L. <i>Haemopsis</i> <i>sanguisuga</i> L. (Laboratory infection)	<i>Lymnaea</i> , <i>stagnalis</i> L. <i>L. auricularia</i> L. (Natural infection)

EXPERIMENTAL INFECTION

1. An adult pigeon — *Columba livia dom.* L. — was fed with 15 naked mollusks of the species *Lymnaea stagnalis* L. collected in the fishpond Škaredý near Písek in 1961; these mollusks harboured a total of 156 tetracotyles of various age. The pigeon was killed 10 days post infection. Post-mortem examination revealed 8 *Cotylurus strigeoides* and 56 *Echinoparyphium recurvatum* (Linstow) located in the anterior half of the jejunum.

2. A chicken — *Gallus gallus* L. — aged 2 months was fed with 20 *L. stagnalis* L. collected in the Lenešický fishpond near Louny; the mollusks were infected with 366 tetracotyles of various age. The chicken was killed 5 days p. i. Post-mortem examination revealed 2 *Cotylurus strigeoides*, 60 *Echinoparyphium recurvatum* (both species located in the first half of the jejunum) and 12 *Echinostoma revolutum* (Frölich), located in the ileum.

3. A duckling — *Anas platyrhyncha dom.* L. — aged 4 weeks, was fed with 60 naked *Lymnaea auricularia* L. collected in the fishpond Klec (Třeboň); these harboured about 312 tetracotyles of various age. The duckling was killed 13 days after infection. In post-mortem examination we found 6 *Cotylurus strigeoides*, 7 *Echinoparyphium recurvatum* (in the first quarter of the jejunum), 15 *Hypodaereum conoideum* (Bloch) (in the middle quarter of the jejunum) and 2 *Notocotylus attenuatus* (Rud.) (in the caeca).

Natural infections by *Cotylurus strigeoides* Dubois, 1958 were found in post-mortem examinations in *Anas platyrhynchos* dom. L., *A. platyrhynchos* L., *A. strepera* L., *Aythya ferina* L. and *Aythya fuligula* L.

DESCRIPTION OF THE TREMATODES OF THE SPECIES *COTYLURUS STRIGEOIDES* DUBOIS, 1958 RECOVERED

Characteristic features: The forebody is longer than wide, cup-shaped. The ventral side is shorter than the very convex dorsal side, forming an almost right angle with the hindbody. The lobes of the holdfast organ rise moderately above the cranial margin. Minute bundles of vitellaria are distributed up to the level of the cranial margin of the ventral sucker and, at the dorsal side, extended up to the oral sucker.

Table 2. Survey of metric data of the species *Cotylurus strigeoides* Dubois, 1958. (Measurements in mm.)

	Dubois 1968	Opravilová 1969	Own findings	
Total length	up to 1.9	1.09—1.589	1.05—1.56	1.15—1.87
Forebody	L. 0.44—0.71	0.4—0.59	0.4—0.71	0.455—0.71
	W. 0.42—0.69	0.39—0.59	0.42—0.64	0.504—0.6
Hindbody	L. 1.03—1.19	0.56—1.112	0.74—0.85	0.696—1.2
	W. 0.45—0.65	0.33—0.588	0.32—0.45	0.408—0.69
Oral sucker	L. 0.1—0.14	0.1—0.138	0.11—0.132	0.072—0.906
	W. 0.11—0.149	0.1—0.124	0.104—0.14	0.06—0.12
Pharynx	L. 0.06—0.1	0.04—0.069	0.048—0.06	0.03—0.036
	W. 0.05—0.095	0.048—0.069	0.048—0.06	0.024—0.036
Ventral sucker	L. 0.11—0.157	0.11—0.138	0.104—0.16	0.12—0.16
	W. 0.12—0.16	0.11—0.159	0.104—0.16	0.12—0.16
Ovary	L. 0.1—0.13	0.08—0.145	0.08—0.1	0.096—0.12
	W. 0.11—0.15	0.08—0.145	0.1—0.14	0.072—0.144
Testis ant.	L. 0.17—0.3	0.11—0.31	0.2—0.25	0.12—0.192
	W. 0.17—0.36	0.13—0.297	0.16—0.2	0.14—0.288
Testis post.	L. 0.2—0.3	0.11—0.276	0.15—0.2	0.168—0.216
	W. 0.18—0.36	0.12—0.359	0.17—0.2	0.216—0.24
Bulbus	L. 0.12—0.15		0.1—0.12	0.072
	W. 0.09—0.117		0.05—0.11	0.066
Eggs	L. 0.08—0.099	0.08—0.109	0.08—0.096	0.072—0.096
	W. 0.05—0.07	0.04—0.069	0.04—0.066	0.048—0.06
Host:	<i>Anas acuta</i> L. <i>A. americana</i> Gm. <i>Clangula hyemalis</i> L. <i>Lagopus mutus</i> (Montin) (Natural infection.)	<i>Anas platyrh. dom.</i> L. <i>Gallus gallus dom.</i> L. <i>Columba livia dom.</i> L. (Experimental infection.)	<i>Columba livia dom.</i> L. <i>Gallus gallus dom.</i> L. (Experimental infection.) <i>A. plat. dom.</i> L. <i>A. platyrh.</i> L. <i>A. strepera</i> L. <i>Aythya ferina</i> L., <i>Ayt. fuligula</i> L. (Natural infection.)	<i>Anas platyrh. dom.</i> L. (Experimental infection.)

The hindbody is oval with a very convex ventral side and a straight dorsal side. The caudal portion is very attenuated and rounded. The ratio of fore- to hindbody is 1.5—2.0. The spherical ovary lies on the borderline between the fore- and hindbody or slightly

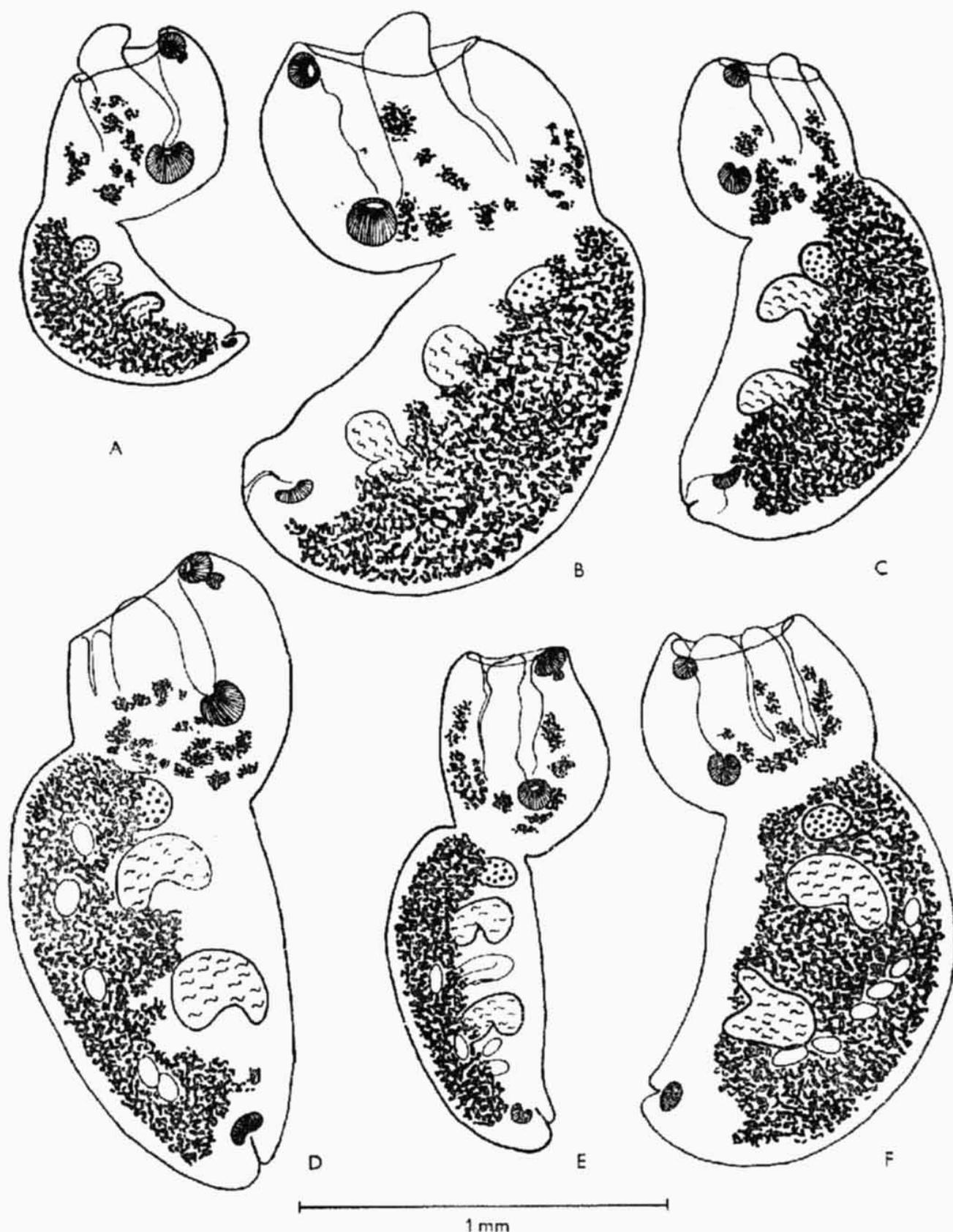


Fig. 1. *Cotylurus strigeoides* Dubois, 1958. A — *Columba livia* dom. L. (exp.), B — *Anas platyrhynchos* dom. L. (natur. inf.), C, D, F — *Anas platyrhynchos* dom. L. (exp.), E — *Gallus gallus* L. (exp.)
A. platyrhynchos L., *A. strepera* L., *Aythya ferina* L., *Aythya fuligula* L. (natur. inf.).

distant from it resting on the cranial margin of the anterior testis. It is situated in the 8—15/100th of the hindbody. The testes have two to three lobes pointing in caudal direction. The genital bulb is clearly visible, it lies in the attenuated caudal portion of the hindbody. Our specimens contained very few eggs (3—5). The bundles of vitellaria in the hindbody were not connected with those in the forebody.

DISCUSSION

The trematode *Cotylurus strigeoides* Dubois, 1958 was first described from California and Alaska by Dubois (1968). In Czechoslovakia, the first report of the presence of this trematode species was given by Opravilová (1969). In her experiments, the author obtained tetracotyles of this trematode species from leeches of the species *Erpobdella octoculata* L., *E. lineata* L. and *Haemopsis sanguisuga* L., infected with cercariae from the mollusks *Planorbis corneus* L. and *Physa fontinalis* L. These cercariae (*Cercaria strigeoides* Opravilová, 1969) are, according to Opravilová, identical with the *Cercaria dubia* Wiśniewski, 1935, *C. tetraglandis* Iles, 1959 and *C. cotyluri* sp. Žďárská, 1963.

Wiśniewski (1935) observed that leeches are more readily and more frequently infected by *C. dubia* than the mollusks. These experiments showed that the cercaria develops to an infective tetracotyle also in the mollusks. Feeding experiments with tetracotyle infected leeches collected in the same biotopes and directly in the same sites as mollusks did not give positive results in the same species of definitive hosts. Present knowledge indicates that the cercariae of the genus *Cotylurus* Szidat, 1928, are not always bound to a certain second intermediate host; this finding seems to be exceptional as suggested by our experiments with the species *Cotylurus cornutus* (Rud.) and *C. brevis* Dubois et Rausch, 1950.

The characteristic differentiating features of morphologically closely related trematodes of the genus *Cotylurus* Szidat, 1928 are these:

Cotylurus strigeoides Dubois, 1958 — the vitellaria in the forebody reach up to the level of the oral sucker. The ovary lies on the borderline between the fore- and hindbody or rests on the anterior testis.

Cotylurus gallinulae hebraicus Dubois, 1934 — the vitellaria in the forebody reach the level of the ventral sucker. The uterus is situated at up to 1/3rd of the length of the hindbody.

Cotylurus lutzi Basch, 1969 — the vitellaria extend up to the level of the oral sucker situated in the lobes of the holdfast organ in the forebody. The uterus lies at 1/4th to 1/3rd of length of the hindbody in front of the anterior testis.

If the vitellaria in the forebody are not well-developed or not well stained, the species can be mistaken for the species *Cotylurus brevis* Dubois et Rausch, 1950 and that chiefly with its younger forms, which are most similar in shape to the trematodes of the species *C. strigeoides*.

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